

### **Thirty-Three More Questions on Biogeochemical Cycles**

1. Which of the following is NOT a carbon sink?
  - (A) limestone sediment
  - (B) trees
  - (C) the atmosphere
  - (D) coal and other fossil fuels stored in the Earth's crust
  - (E) the ocean
2. Nitrogen is essential for living organisms to make
  - (A) lipids
  - (B) proteins
  - (C) carbohydrates
  - (D) sulfates
  - (E) nitrites
3. Nitrogen gas accounts for what percentage of the atmosphere?
  - (A) 21%
  - (B) 28%
  - (C) 71%
  - (D) 78%
  - (E) 97%
4. What is the first step in the nitrogen cycle, in which gaseous nitrogen is converted into ammonia?
  - (A) nitrification
  - (B) ammonification
  - (C) assimilation
  - (D) denitrification
  - (E) nitrogen fixation
5. What part of the nitrogen cycle deals with the conversion of nitrogen in waste products or dead organisms into ammonia?
  - (A) nitrification
  - (B) ammonification
  - (C) assimilation
  - (D) denitrification
  - (E) nitrogen fixation
6. The process where some bacteria remove nitrate from the soil by converting it to nitrogen gas is
  - (A) nitrification
  - (B) ammonification
  - (C) assimilation
  - (D) denitrification
  - (E) nitrogen fixation

7. The step in the nitrogen cycle where bacteria convert ammonia ( $\text{NH}_3$ ) to nitrate ( $\text{NO}_3^-$ ) is
- (A) nitrification
  - (B) ammonification
  - (C) assimilation
  - (D) denitrification
  - (E) nitrogen fixation
8. The step in the nitrogen cycle where plants take up nitrate and use it to make biological molecules is
- (A) nitrification
  - (B) ammonification
  - (C) assimilation
  - (D) denitrification
  - (E) nitrogen fixation
9. The phosphorus cycle differs from the carbon cycle in that
- (A) there is little or no human impact on the phosphorus cycle
  - (B) phosphorus is not a critical component of living organisms
  - (C) the hydrosphere contributes to part of the phosphorus cycle
  - (D) the atmosphere does not contribute to part of the phosphorus cycle
  - (E) plants play a role in the carbon cycle, but have no role in the phosphorus cycle
10. One human impact on the phosphorus cycle occurs through
- (A) burning of fossil fuels
  - (B) the use of fertilizers
  - (C) the greenhouse effect
  - (D) global warming
  - (E) acid rain formation
11. Which of the following processes plays an important role in the phosphorus cycle?
- (A) weathering and erosion
  - (B) assimilation
  - (C) combustion
  - (D) cell respiration
  - (E) ammonification
12. Water that percolates through the soil and rock
- (A) increases in areas where runoff is a dominant process
  - (B) is no longer part of the hydrologic cycle
  - (C) becomes groundwater or recharges aquifers
  - (D) is part of the process known as transpiration
  - (E) must move into the ocean before returning to the surface
13. Transpiration occurs in
- (A) oceans.
  - (B) groundwater
  - (C) the atmosphere
  - (D) animals
  - (E) terrestrial plants

14. Biogeochemical cycles:
- (A) only include processes conducted by or within living organisms
  - (B) pertain only to the abiotic environment
  - (C) describe the movement of water and other materials throughout the abiotic and biotic environment
  - (D) only pertain to exchanges and interactions that occur within the atmosphere
  - (E) are used to describe the attempts of humans to recycle various pollutants
15. Which of the following is NOT one of the biogeochemical cycles considered to have particular importance for organisms?
- (A) carbon
  - (B) hydrogen
  - (C) nitrogen
  - (D) phosphorus
  - (E) water
16. Approximately what percentage of the atmosphere is CO<sub>2</sub>?
- (A) 0.04%
  - (B) 3%
  - (C) 10%
  - (D) 30%
  - (E) 75%
17. Which of the following accurately represents a carbon source and the process which releases carbon from that source?
- (A) fossil fuels, respiration
  - (B) animals, photosynthesis
  - (C) plants, cell respiration
  - (D) bicarbonate, combustion
  - (E) limestone, combustion
18. As written the below chemical process occurs in which of the following?
- $$6\text{CO}_2 + 12\text{H}_2\text{O} + \text{radiant energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$$
- (A) anaerobic bacteria
  - (B) terrestrial plants
  - (C) aquatic plants
  - (D) B and C only
  - (E) all of the above
19. Which of the following is NOT a source of carbon for the carbon cycle?
- (A) shells of marine organisms
  - (B) oil
  - (C) decomposers
  - (D) fertilizer
  - (E) the atmosphere
20. What is the composition of sulfuric acid rain?
- (A) H<sub>2</sub>S
  - (B) SO<sub>2</sub>
  - (C) S<sub>2</sub>O<sub>4</sub>
  - (D) H<sub>2</sub>SO<sub>4</sub>
  - (E) SAr

21. Which two processes refer to the compaction of rock, mineral and/or organic particles into rock?
- (A) carbonification and combustion
  - (B) decomposition and sedimentation
  - (C) sedimentation and carbonification
  - (D) eutrophication and nitrification
  - (E) carbonification and eutrophication
22. Which human activities have an effect on the sulfur cycle?
- (A) mining
  - (B) burning fossils fuels
  - (C) smelting
  - (D) A and C, only
  - (E) all of the above
23. Approximately how much water is usable and attainable freshwater?
- (A) less than 1%
  - (B) 1%
  - (C) 2%
  - (D) 3%
  - (E) 71%
24. Which of the following processes add carbon dioxide to the atmosphere?
- I. photosynthesis
  - II. combustion
  - III. decomposer respiration
  - IV. animal respiration
- (A) I, only
  - (B) I and II, only
  - (C) II and IV, only
  - (D) II, III, and IV, only
  - (E) I, II, III, and IV
25. During the process of decomposition, anaerobic bacteria can produce
- (A)  $\text{H}_2\text{S}$  and  $\text{N}_2\text{O}$
  - (B)  $\text{N}_2$  and  $\text{HNO}_3$
  - (C)  $\text{S}_2\text{O}_4$  and  $\text{O}_2$
  - (D)  $\text{CaCO}_3$  and  $\text{CO}_3^{2-}$
  - (E)  $\text{SO}_2$  and  $\text{PO}_4^{3-}$
26. Which two processes contribute to an excess of  $\text{CO}_2$  in the atmosphere?
- (A) carbonification and combustion
  - (B) combustion and deforestation
  - (C) smelting and chemical fertilizer use
  - (D) land clearing and animal respiration
  - (E) decomposition and sedimentation

27. Which two cycles are cumulatively the slowest in nature because they are dominantly sedimentary cycles and driven by geological processes?
- (A) carbon and water
  - (B) water and nitrogen
  - (C) nitrogen and phosphorus
  - (D) phosphorus and sulfur
  - (E) nitrogen and carbon

Use the following list of processes to answer 28-30.

- (A) nitrification
- (B) denitrification
- (C) organic nitrogen fixation
- (D) ammonification
- (E) assimilation

28. performed in the root systems of soybeans
29. directly leads to the formation of  $\text{NO}_3^-$
30. decomposition process that forms  $\text{NH}_3$  from dead organic matter

Use the following list of compounds to answer 31-33.

- (A) gypsum
- (B) pyrite
- (C) sulfuric acid
- (D) nitric acid
- (E) limestone

31. mined for its iron and sulfur content
32. formed by sedimentation of carbonate material
33. can contribute to eutrophication